THE Chemical Age

VOL. LXXIV 11 FEBRUARY 1956 No. 1909

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Detection & Dissection

THE somewhat gruesomely 'Whodunnit' title refers mildly enough to that form of scientific literature known as "abstracts". However, the title is apt even if it is misleadingly dramatic. Abstract journals (or *vide* the ACS abstract services) are often approached by scientists in a spirit of detection, and the task of abstracting an original paper is reasonably called dissection.

One of the best comments upon this subject that we have seen for many a month is the opening paragraph of a new article by M. Fleischer and M. Hooker of the US Geological Survey (*J. Chemical Education*, 1956, **33**, [1], 27). 'The ever increasing amount of literature being published in all branches of science—far more than the individual scientist can hope to skim, much less to read—has focussed more and more attention on the role and importance of the abstract, and has emphasized the need for study of the numerous problems connected with all phases of abstracting. Among the most obvious of these problems are what should be abstracted, who should prepare the abstracts, and what they should contain.'

This current summing-up is perhaps obvious enough, but it has the great merit of clarity. The same paper states the five-point 'recipe' for a good abstract, that it should answer the questions, *Who?—Where?—When?—What?—Why?*

The first three are one cent rather than $64,000 questions—they involve nothing more than accurate citation according to the accepted code for journal references. But the last two questions bring in all the variations of compromise, opinion, and policy. There are two basic types of abstract—the abstract that indicates the scope and perhaps the main conclusion of a paper, and may be little more than an extended title; and the abstract that gives a condensed version of the paper. The former may be enough to serve the specialized research worker's purpose of detection; the latter represents dissection and should, if done with competence, serve all expectable needs of abstract-users. These are the two extremes of abstract species, but in practice a diversity of crossbred mixtures in between these extremes will be found.

How far an abstract should attempt to summarize the '*What?*' and '*Why?* of an original paper is decided in ideal theory by the editorial policy of the abstract-publishing journal, and this policy should make a hand-and-glove fit with the main needs of the journal's users. But here the operative words are 'in ideal theory'. In practice abstract journals are used by a diversity of researchers; in practice the high costs of maintaining an abstract service often impose limits of space; in practice it is far from easy to recruit writers of abstracts, so that even when no other limiting factors operate, the preparation of an abstract may not fulfil editorial policy requirements with reasonably complete accuracy. To expect perfection is to ignore these facts of life.

Even if these sources of variation did not exist, however, editorial policy would be far from easy to formulate. Every

abstract journal or service has a chosen field. The wider this field, the more difficult it must be to assess the range of user-requirement. The inverse of this statement should be happily true—that with a narrow field the range of user-requirement can be easily estimated. But here other difficulties enter the picture. No field of science is today so narrow that its boundaries can be safely and sharply drawn. Scientific papers are rarely written with punctilious homage to this subject and often enough the most important papers bulge out beyond their expectable subject-boundaries at several points.

The more narrow the field of an abstract journal, the more it is expected to serve the needs of specialization; these breaches of boundaries must be included rather than excluded. It is probably true to say that no editorial policy for abstracting can avoid compromises in formulation. This cause of inconsistency must be added to the variations with which abstract-writers are able to fulfil a prescribed policy.

All this seems to amount to a catalogue of woe and imperfection. But it should in fact represent a compliment to the skill and hard labour of abstract editors and writers. It is necessary to recognize all these basic difficulties before passing judgment upon the qualities of abstract publications. It might also be added that few chores of science are as humbly rewarded in economic terms as that of abstract preparation; this is rarely nowadays a labour of pocket and profit, and almost always it must be a genuine labour of love and bare cost.

It is not a matter of saying how imperfect our science abstracts are, but of realizing how good they are considering the many problems of production. But can the past and current standard of performance be maintained? In width and complexity the growth of sciences is accelerating each year, and even in narrow fields the need to rely more heavily upon abstracts increases. At the same time these factors of growth are making it more difficult to minimize abstract imperfections, and, as both this country and the United States have now realized with some pain, the costs of abstracting are bringing new problems of publication and limitation.

Efforts of a modern market-study kind are being employed to investigate end-use. It is being found in the United States, for example, that so many per cent of users of a specialized abstract publication also use the much more general *Chemical Abstracts*. It may be possible by these means to economize on a few end-use overlaps, but one must doubt whether this kind of quest for simplification will bring enough benefit to offset the obvious risks of loss. If some scientists have time to use two or three abstract publications, others are forced to rely mainly upon one. One of the original purposes of abstract services was to reduce the confinements of specialization. Too much close-cut 'departmentalism' with abstracts casts this virtue away.

More and more the importance of selective and periodic surveys of specific scientific fields is emphasized. Unfortunately the scientists most fitted to produce these surveys are likely to be too busily engaged in their own research work. One possible answer to this problem—which is no more than a dilemma of the personal time-table—is for the over-busy specialist to carry out the topic-selection and for somebody else to write the survey. Another is the modern practice of the Society of Chemical Industry for its Annual Reports of Applied Chemistry whereby the over-all task in certain fields is carried out compositely by members of the Society's specialized groups. A third solution is the development of abstract services by industry's research associations, and this in quite a number of cases is making admirable progress. Nor are we being biassed in mentioning that trade-technical journals also make a useful contribution by frequently publishing survey-articles.

The wise man has been well-defined as somebody who does not expect other people to behave better than they can. So it should be with this subject. No one should expect scientific literature of the 'digest' kind to be better than it can be having regard to the many difficulties it has to face.

Notes & Comments

US Items

TWO interesting though disconnected pieces of chemical product news were announced at the recent meeting of the American Association for the Advancement of Science in Atlanta. The first concerns what is now almost an elderly chemical—DDT. Its toxicity has been exhaustively tested by human 'guinea-pigs'. Fourteen male volunteers at Savannah ate DDT every day for a year, the daily dosage rate being 200 times as large as the calculated average amount that the normal person is likely to take in as a residue from DDT sprays on fruit or vegetables. It was reported that every one of the volunteers maintained good health throughout this long test period; there were no signs of illness of any kind that could be related to DDT effects. A year is considered long enough for this type of test to be regarded as conclusive. DDT accumulates in the body-fat tissues, but the maximum amount that can be held is reached in a year at this rate of test ingestion. Alarmist criticisms about DDT residues have apparently been given a very firm reply.

Dogs & Dog-Owners

THE other particularly unusual item is likely to be appreciated most by dogs and dog-owners. A cheaper, simpler, and much safer method of dealing with parasitic worms has been developed at the North Dakota Experiment Station. Highly soluble piperazine citrate is added to the animals' drinking water. This drug is not toxic at 10 times the dosage needed to deal with worms. As well as having a removing effect the drug also acts preventatively. It is said to be also effective with worms in sheep, poultry, and pigs.

PVP-Iodine

PHARMACEUTICAL chemicals occasionally make jumps into other markets, particularly into horticultural markets. The original organo-mercury drugs made a notable jump into the fungicide field between the wars. A new development of this kind seems likely for polyvinyl-pyrrolidone. This chemical has had pharmaceutical uses for many years, and now its complex with iodine has been found to possess good insecticidal and fungicidal properties. Polyvinyl-pyrrolidone-iodine is a very stable compound with good solubility in water. Quite dilute solutions—100 to 1,000 ppm—if sprayed on soil give good control over a wide range of soil pests including some of the difficult *nematodes*. The substance's vapour pressure is low so that it remains effective in the soil for a long period. Foliage sprays have given useful kills of red spider mites and 90 per cent kills with aphids. As to the fungicidal properties, these seem somewhat limited—underground root-rotting diseases caused by fungi seem to be usefully controlled. However, it may well be that this is no more than an indirectly fungicidal effect primarily due to the control given over soil insects that first attack roots and thereby create sites for fungal infection.

Iodine Detoxified

IT is possible that iodine itself is the main agent in these pesticidal effects of PVP-iodine. Apparently the role of the PVP complex is to detoxify iodine, reducing its plant-damaging properties without unduly reducing its toxicity to many kinds of insects. The US company now actively developing PVP-iodine for horticultural use is making it with an available iodine content (in solution) from five to 15 per cent. This also suggests that iodine is the more active part of the complex.

Owing to a dispute in the printing trade, to which we are not parties, there is a risk that some copies of this issue will be late in reaching readers' hands. We desire to express our regret for any annoyance or inconvenience that may be caused by circumstances that are beyond our control

The 1956 BIF

Chemical Section Best Ever

THE number of chemical manufacturers who will exhibit at the British Industries Fair at Olympia, London, from 23 April to 4 May will be a record. No fewer than 120 of Britain's leading chemical firms will be represented and the section devoted to the industry will occupy more than 29,000 square feet—the entire ground floor of the National Hall. Furthermore, the display will be more representative than ever before as the size of space which any one firm can occupy has been strictly limited and firms from practically every branch of the industry have been admitted.

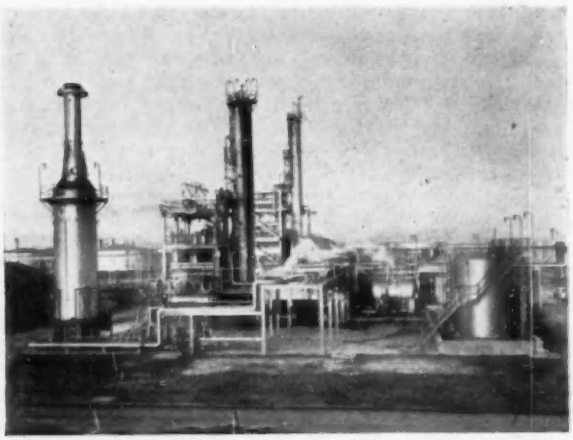
More than 100,000 leaflets have been published advertising the chemical section of the BIF and these are being distributed to chemical consumers all over the world. As a result of this effort it is expected that the number of foreign buyers who will attend will also be a record and exhibitors are taking steps to ensure that no one will return home feeling that his visit was not a rewarding experience. In the past the BIF has not proved worthwhile from either the exhibitors' or buyers' points of view and this year every effort is being made to alter this unfortunate situation.

Outlining the steps which the Association of British Chemical Manufacturers and member and non-member firms were taking to make the 1956 BIF an outstanding success, Mr. J. Davidson Pratt, the ABCM director and secretary, told members of the press last week that the UK chemical industry ranked fourth among the nation's exporting industries, sending overseas one-third of its annual production. The industry, he said, was determined to maintain its position and was resolved to make the BIF the best show ever put on.

The week following the exhibition would see the beginning of celebrations marking the 100th anniversary of the discovery of the first synthetic dyestuff by William Henry Perkin. This discovery had laid the foundations of the huge organic chemical industry existing today. With this double attraction there was every reason to believe that chemical technologists and chemical users from all parts of the world would be converging upon London in late April and early May. The year 1956 should go down in history as a British Chemical Year.

Natural Gas Search

A search for natural gas 7,000 ft. below the Yorkshire Wolds at Fordon, near Scarborough, is to be made by the North Eastern Gas Board. Dr. R. S. Edwards, chairman of the board, said recently that the board would spend £1,000,000 on what was in effect a gamble. Drilling would cost about £7 a foot and gas was likely to be found at 7,000 ft.



General view of the detergent alkylate plant at Grangemouth which as Grange Chemicals Ltd. recently announced, is now producing dodecylbenzene at the design rate of 10,000 tons per year. (see THE CHEMICAL AGE, 1956, 74, 335)

New Output Records in Germany

But Lack of Reserve Capacity Slows Expansion

PRODUCTION of industrial chemicals continued to increase in the German Federal Republic last year but the pace of expansion was slower than in 1954. The output index for inorganic products rose by 10 per cent to 201 (1938 = 100) and that for organic chemicals by 7½ per cent to 260.5. The slowing-down of the rate of production increase is attributed chiefly to lack of unused capacity. Many German chemical manufacturers touched the capacity ceiling in 1953 and have been raising their output since at the pace permitted by new plant coming into operation.

Capital expenditure on new plant last year was probably somewhat higher than in 1954 when it was estimated at DM 1,000,000,000 for the rather wide range of industries included in the chemical group in Germany, and it is expected that capital expenditure in the German chemical industry will again be heavy this year though a rather higher proportion may in future be spent on modernization and automation in an effort to keep German prices competitive in the world market.

Chemical exports from the Federal Republic rose by 15 per cent to DM 3,400,000,000 last year and, as in 1954, accounted for 24 per cent of total sales. In view of the generally favourable conditions in the home market and the severe competition met abroad, German observers regard this increase as satisfactory; there is however some reason to believe that some of the additional shipments went into stocks of foreign distributing agencies, just as producers' and merchants' stocks at home also seem to have increased slightly.

German Exporters Hit

Import liberalization in some countries has hit German exporters by allowing US manufacturers to compete more successfully with them, and the efforts of Soviet satellites to extend their foothold in the Middle East and southern Asia threaten to impair the profitability of West German sales to this traditionally important area. The export outlook is, further, obscured by difficulties which have arisen in trade and payments negotiations with Brazil, Argentina, Turkey and Egypt.

The production of sulphuric acid increased last year by 8.5 per cent to 1,825,000 tons (SO_3), synthetic ammonia by 14 per cent to 806,000 tons, chlorine by 11.7 per cent to 404,000 tons and caustic soda, by a similar percentage, to 556,000 tons. The output of calcium carbide rose by two per cent only to 821,000 tons owing to temporary shortage of hydro-electric power, and soda by 5.2 per cent to 983,000 tons.

Natural Gas

Germany's natural gas production last year increased from 87,000,000 to 239,500,000 cubic metres of which a growing proportion is being used for chemical purposes by Badische Anilin- und Soda-Fabrik, Ludwigshafen, Röhm & Haas, Darmstadt, Farbwerke Höchst, and Chemische Werke Hüls. Last year about one-fifth of the total output appears to have been used for chemical processing.

Farbwerke Höchst AG was the first of the big chemical groups to report on the past year. Total sales increased by DM 143,000,000 to DM 1,270,000,000 of which DM 380,000,000 were accounted for by exports. Sales of most inorganic chemicals were limited only by shortage of output capacity. The mounting demand for plastics was also met only to the extent permitted by available plant. A polyester fibre called Diolen will go into production this summer.

Satisfactory sales were recorded for waxes, camphor, fertilizers and agricultural chemicals in general. The dyestuffs business declined but still accounted for 55 per cent of all company's sales: the pharmaceutical group, the company's second important line, recorded good sales figures. The export prospects are viewed 'with some scepticism', partly because of difficulties in the Far Eastern markets whereas the European and American markets are considered 'fairly safe'. Export prices in some sections are expected to decline further.

No less than DM 69,000,000, i.e., 5.5 per cent of turnover, was spent on research and development by Farbwerke Höchst AG last

year. Capital expenditure on new plant and extensions amounted to DM 233,000,000, compared with DM 135,000,000 in 1954, and new plant to be erected this year will call for investment of more than DM 200,000,000, largely for basic inorganic and organic chemicals, especially petroleum chemicals, and for plastics and fibres. Over DM 5,000,000 are required for a heavy plant in course of erection. An electronic computer of most modern design is to be installed at Höchst; it will be available in the latter part of 1957 and help to carry out the 'extensive rationalization measures' deemed necessary.

This rationalization appears to include arrangements between the leading chemical producers concerning their production, construction and research programmes. It is learnt that an agreement on these points has been reached by the three leading companies—Bayer, Höchst and BASF—concerning the part to be played by Cassella Farbwerke Mainkur AG, another major IG Farbenindustrie successor the majority of shares in which have found their way into the hands of the three leaders. It may be surmised that this agreement is concerned chiefly with the future sales of dyestuffs and plastics. The legal independence of the Cassella works however is to be maintained.

Farbenfabriken Bayer AG increased its sales last year by about DM 200,000,000 to about DM 1,400,000,000 to which exports contributed over DM 500,000,000. Capital expenditure rose from DM 186,000,000 to DM 210,000,000 but is expected to decline this year. The company will shortly issue another DM 162,300,000 of ordinary shares, raising the total capital to over DM 550,000,000. The labour force increased by 12 per cent last year, compared with an increase in sales by 17 per cent. Labour productivity thus rose by approximately five per cent, a result attributed to more efficient deployment of productive resources.

New Nitric Acid Unit

ICI's Nobel Division Project

FOUNDATIONS are being prepared for a new nitric acid concentration unit at ICI's Nobel Division, Ardeer. The site for the new plant is in the acids department to the north-west of and near to T.5 and T.6 sulphuric acid plants. When in operation the plant will concentrate weak nitric acid from 60 per cent strength to 99/100 per cent strength which has advantages over the currently available 94/96 per cent strength for making the mixed acids used in Ardeer's nitration processes. Production capacity will be 16,000 tons per year. This unit, if successful, will be extended to eliminate the existing nitric acid concentration tower process which involves reconcentration of sulphuric acid by the Gaillard tower process.

Certain disadvantages in these latter processes, such as high maintenance costs and obnoxious effluents, caused Nobel Division technical men to seek an alternative. That alternative is the plant now about to be built. In this new plant the entire process will be carried on in one building 110 ft. high and covering a relatively small ground area. The absorbing substance for the water from the weak nitric acid instead of being sulphuric acid is a solution of magnesium nitrate which is simply reconcentrated in the same building. This plant will be the first unit in the world to make a commercial application of the principle.

Steel piling is now completed and excavation is well under way. The new plant is expected to be in operation before the end of the year. In its design there will be built-in aids to safety with easy access platforms and stairs to the controls. The plant will be highly instrumented and the corrosion resisting materials used in its construction, stainless steel and silicon iron, are expected to reduce maintenance cost. The process will give much better working conditions than older types of concentration plant; it will be an open tower building with only the control room under cover.

When this unit is in operation it will deliver 99 per cent nitric acid at the rate of 16,000 tons per year. If it is completely successful, a second unit will be built.

Mobile Crop Spraying Units

Two mobile crop spraying units of Fisons Pest Control have begun a tour of the country. The units, which will spend a day at 73 of the foremost agricultural centres, will have crop spraying specialists in attendance to advise farmers on the types of machine and chemical most suitable to meet their weed and pest problems.

Battelle in Europe

European Laboratories Help Ease Scientist Shortage

by ROBERT Q. WILSON, M.Sc.

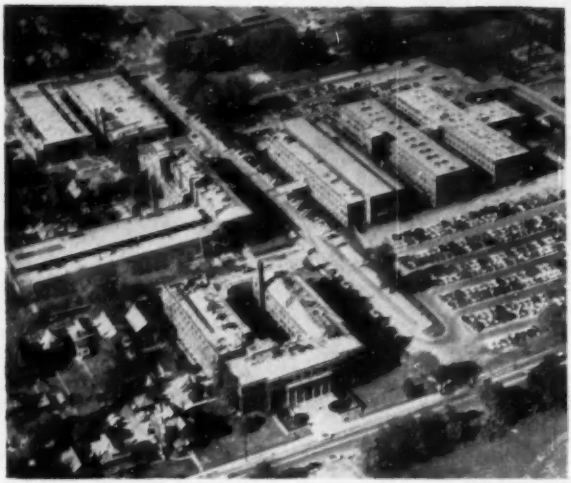
Mr. Robert Q. Wilson, general manager of Battelle Institute Ltd., 44 Bryanston Street, London, W.1., received his B.Sc. degree from Heidelberg College and his M.Sc. degree in chemical engineering from The Ohio State University. Prior to this appointment he was a research adminstrator at Battelle's United States laboratory and with the US Government. He has also served as an officer in the US Navy

SPONSORED industrial research, a relatively new concept in Europe, has been discussed widely in the technical press and at industrial and scientific meetings in Great Britain over the past two years. Although most comments were favourable toward this type of service, many have wondered if sponsored research in Europe would ever approach the importance that it has attained in the United States. Some have questioned for whom and for what reasons such services might be used in view of the difference in the approach to research as well as the facilities and funds available. This, coupled with the general shortage of technical personnel, especially in Great Britain, makes it of interest to note the progress that has been made in Battelle's two new European laboratories during this same period.

Battelle's Frankfurt laboratory, the first to be finished, has been in operation since early 1954. In its first year, the annual volume of research reached a level that was not achieved by the parent United States laboratories in Columbus, Ohio, until after nine years of operation. The staff now numbers over 310 scientists and supporting personnel. The Geneva laboratory, smaller in size, was dedicated in November 1954 and has been growing rapidly as well. The staff of 120 are conducting research investigations for industries in nearly every country in Western Europe. Both laboratories operate on the same not-for-profit contract research plan established at the Institute's Columbus laboratories in the United States.

Founded in 1929 through the will of the American industrialist, Gordon Battelle, the Battelle laboratories have grown from a nucleus of 20 staff members to an organization employing approximately 2,600. Although most of the early expansion took place through demand for its services by American industry, organizations in Europe and other parts of the world began after World War II, to sponsor an ever increasing volume of research. This led the Battelle management to consider the possibilities of providing facilities abroad and in 1950, it was decided to extend the laboratories directly to Western Europe.

In general, Battelle's European reception was good from the start. For example, the City of Frankfurt gave Battelle approximately 18 acres of ground for the construction of a laboratory. Registration as a not-for-profit entity was another expression of faith in Battelle's operations accorded by both the German and Swiss Authorities. However, all did not view Battelle's move with optimism or even approval. It was difficult for some to understand why an American research laboratory would risk extension to Europe without hopes of realizing a profit. Others foresaw conflict with established co-operative and government sponsored laboratories. Fortunately during the construction period many of the fears and uncertainties were overcome with the help of friends, both in the universities and industry.



The main laboratories of Battelle at Columbus, Ohio

Battelle learned early in its development in the United States that the team approach to a particular research problem was one of the many important advantages offered by a facility of this type. Thus, in planning for the European laboratories, it was deemed important to provide an organization that would be diverse and yet specialized enough to work effectively for many industries. This was done by providing facilities and employing specialists which represented all of the basic sciences. The staff, moreover, represented experience in industries that would be most likely to use these services.

From the beginning, therefore, the primary technical requirements, organization and method of operation were patterned directly from those that were found successful in Battelle's US laboratories. The buildings themselves were constructed on the basis of knowledge gained in the parent laboratory to which experience and techniques recommended by European scientists and architects were added.

The laboratories in Frankfurt/Main comprise two connecting buildings and an adjacent boiler plant. Its three stories and basement gives a total of 168,000 square feet of floor place. Within this area, facilities are provided for research in the fields of metallurgy, physics, ceramics, mechanical engineering, the various branches of chemistry and engineering economics. New

The attractively modern laboratories of Battelle at Geneva

This fine building, the home of Battelle Frankfurt, was erected in record time

facilities are being added periodically as demands for more specialized services grow. The recent addition of engine testing and radioisotope laboratories are examples of this expansion.

At Geneva, a laboratory of 40,000 square feet is provided in a modern three-story building and basement. Research there is being conducted in the fields of biology, bio-, electro-, inorganic, organic and radiochemistry, electronics, physics, metallurgy and engineering economics. As at Frankfurt, new facilities are being added as demanded. The staff of the Geneva laboratory is quite different however. Whereas the Frankfurt staff is predominantly German and Austrian in origin, the Geneva staff is more international. Although mostly Swiss, also included are technologists from Austria, Australia, Belgium, France, Germany, Holland, and Italy.

Soon after the completion of these European laboratories, offices were established in London, Madrid, Milan and Paris to bring Battelle's services to industries outside Germany and Switzerland. These offices are staffed with technical personnel who can discuss industrial problems in the language of the country and with an understanding of how local conditions may bear on a particular industrial problem.

By and large, industrial users of Battelle's European facilities follow the pattern experienced in the United States. Sponsorship includes many small companies with limited technical capabilities, medium sized firms well equipped to deal with problems in their own speciality, and the large industrial corporations or combines. Investigations range from projects where the solution can be attained in a few weeks or months

Analytical laboratory at Battelle-Frankfurt

Vacuum deposition apparatus at Battelle-Geneva

to complex fundamental studies which are scheduled to continue for several years.

Although Battelle's services are used mostly for the temporary extension of the sponsor's research laboratory in periods of high activity, work outside the company's own technical field, or to provide a new approach to a given problem, some industries find sponsorship on a routine basis advantageous. By giving a scientist maximum freedom, and an environment detached from everyday works problems, chances of making incidental discoveries during a research investigation are increased.

Many sponsors feel that these and the slightly different approach provided by the Battelle laboratories might lead to the realization of a worthwhile development through an unusually keen observation or by obtaining an idea while work is proceeding on a problem with another end objective.

The establishment of these new laboratories has been contributing to the relief of the shortage of technical manpower for many industries in the UK. This shortage seems to be particularly apparent in the new phases of atomic energy, electronics, and the broader field of automation.

Battelle's Columbus laboratory started work in atomic energy in 1941 and has become more and more active each year. A swimming pool type reactor, hot cell and reactor development laboratory are scheduled for completion this Spring.

In Geneva, the staff is particularly well qualified for work in physics, electronics, electrical engineering and physical chemistry. Together with Dr. Hugo Thiemann, technical director, the principal investigator on the development of the well known cinema television system licenced to Twentieth Century Fox Films Company in 1952, are several outstanding European physicists and electrical engineers. Mr. Bohdan Broniewski for example, was the 1953 recipient of the Ampère Award for work on servo-mechanism in France. A year later he was presented with the Annual Honorary Prize for theoretical and experimental research by the Société Française des Electriciens.

These facilities and the industrial toxicology, plastics, ceramics and mechanical engineering laboratories at Frankfurt place many important research services at the disposal of British industry.

The experiment of introducing sponsored research to Europe has been proceeding satisfactorily. In 1955 the Frankfurt laboratory completed more than £175,000 worth of industrial research. The Geneva effort was approximately £100,000. Both now have research contracts for nearly double their 1955 volume which will be conducted this year. This, of course, will increase with the addition of new sponsors as many of the present ones are returning for a second, third or fourth time with problems to be investigated. For example, 36 per cent of the British sponsors have either extended their initial contracts or placed more than one with Battelle.

Although there is still reluctance among some firms to take advantage of the facilities available, all indications are that Battelle in Europe will be successful and will continue to aid in relieving the shortage of technical manpower in Britain.

The Hardening of Silicone Resins

Some Recent Research Described

IN a paper read at the 17th technical meeting of the Paint Materials etc. group at Munich in September last by Dr. Walter Krauss (of Bayer Farbenfab. Leverkusen), and now published jointly under his name and that of Dr. Rolf Kubens (**1**) recent work including their own is reviewed, preceded by a brief discussion of the structure of the silicones and their outstanding value in high temperature work and in other ways.

Some erroneous ideas are corrected in respect to judging thermal stability by the degree of yellowing of the silicone resins, by requiring stability at too high temperatures (up to 500°C), and in regard to economy. The price is somewhat high compared with other products, but it is easy to show that, in most cases, it is well worth it. For long period heating above 150°C special enamels may still be largely used, though the silicone resins have certain advantages that are often useful, such as elasticity, resistance to impact and simplicity of use.

Like all chemical film-formers the silicone resins are in the form of precondensates, namely hydroxylated polysiloxanes, usually obtainable as 50-75 per cent solutions. Condensation to an insoluble film requires higher temperatures than usual, and the main purpose of the present paper is to describe means by which this can be avoided by the use of different quick-hardening catalysts.

Hardening Process

Hardening proceeds in two ways: (a) condensation at high temperature with water split off and formation of an insoluble hydroxyl-free product, and (b) two methyl groups of adjoining siloxane chains combine through oxidation (H.N.Homeyer *et al.* (**2**)). The first predominates and the second operates only with very prolonged ageing above 200°C, resulting, after a few weeks, in gradual friability.

Several accelerators were tried by Homeyer but proved unsuitable. Some catalysts accelerate both reactions. Lead salts appear to be specially effective; but all the metals suffer the disadvantage of causing gelling at room temperature (**3, 4**).

The present authors endeavoured to elucidate the questions whether there are definite relationships between acceleration on the one hand and reduced heat stability of the film, as well as lowered stability of the catalysed silicone resin solutions, on the other. The action of a catalyst depends not only on its own nature but also on the constitution of the resin, so that results with the phenylmethyl resins do not apply necessarily to pure methyl resins. The results were of considerable interest in theory and practice.

Two Types of Resin

Resins used for test were (1) somewhat hard phenylmethyl resin with a relatively high content of the tri-functional groups (oxygen or wetting), and (2) a softer difunctional product. Both were 75 per cent solutions in toluol. Catalyst dosing, however, was reckoned on 100 per cent resins. Hardening time and temperature were determined as follows: a sheet iron panel 100 × 25 × 0.3 mm was first immersed in the undiluted resin solution, and allowed to drip in the open for about 20 minutes. It was then further dried and hardened in the drying cupboard until free from stickiness as determined by the filter paper test described.

To test thermal stability a film of 80 mμ thickness formed on the panel as above was aged in a drying chamber at 240°C, and daily examined, being cooled for a short time to room temperature. The time elapsing before appearance of the first wrinkling or cracking was the measure of thermal stability. For measuring general stability of the catalysed resin solutions these were kept in test tubes at room temperature, and the time noted in which gelling or thickening occurred. Viscosity was determined with the consistency scale of the Inst.f. Lackforschung rising bubble method.

In the first series of tests with catalysts two groups of amines A and B (the former including also triphenylphosphine) were used in conjunction with silicone resin No. 2. The first group, mostly phenyl- or benzylamines proved useless as accelerators except in regard to gelling. Group B, including tri- and other ethanolamines (alkyl) was

more effective as accelerators, but also had certain drawbacks. Generally the amines are not favoured, although triethanolamine is used in the US.

The next series comprised metal complexes, in which special attention was given to viscosity/time curves of the catalysed solutions. These tests are described and discussed at some length and results tabulated for naphthenates of lead, lead-cobalt and lead-zinc in amounts of 0.66 or two per cent (see also (**4**)).

Pigmented Silicone Resins

In their work on catalysed pigmented silicone resins the authors used the same effective metal compounds (naphthenates) as before. They were divisible into two classes: (a) pigments, fillers or dyes that did not affect the metal complex accelerators (catalysts), such as metal-free colours, carbon black, Silcar, Aerosil, talcum etc., and (b) those that had some effect on hardening rate, e.g. some metal oxides or sulphides and organic salts, though the last-named need hardly be considered in either group.

The test here included some aluminium panels which, after 1,300 hours aging at 230°C, still retained a good lustre with little or no sign of cracks etc. (One per cent Pb- and two per cent Zn-naphthenate used with non-metal pigment). In group (b) pigments chief attention was given to titanium dioxide which, more than the others, tends to react strongly with the catalyst. Good results were obtained with a formulation that comprised silicone resin No. 2 (soft), titanium dioxide, and one per cent lead napthenate.

In this series two other silicone resins, Nos. 3 and 4 were included, both prepared with organic binders and therefore less resistant to thermal effects. Their limit in fact was 180°C. Some theoretical considerations are discussed in seeking an explanation of the action of combined hardeners or catalysts and of combined lead salts and pigment. Too little is yet known of the mechanism of acceleration.

It is generally concluded that the common view concerning catalysts such as lead and aluminium salts—which are very effective yet with some alleged drawbacks—is not actually well founded. They can be used to great advantage under the conditions specified, namely, if combined with other less active hardeners (Zn, Co, or Ti salts), present in some excess. With pigmented lacquers the pigment itself fulfils the purpose of a less active catalyst, and these other weaker salts need not be included. This action of the pigment probably depends, as can be shown experimentally, on its content of soluble metal compounds.

The most favourable formulations for unpigmented silicone resins must be considered those with mixtures of 0.05 to 0.5 parts lead naphthenate with one to two parts zinc naphthenate per 100 parts solid resin; and for the pigmented lacquers the best additives appear to be one part lead naphthenate with or without two parts zinc naphthenate.

REFERENCES

(1) W. Krauss & R. Kubens, *Deutsche Farben-Zeit*, 1956, 1, 1-7.
(2) H. N. Homeyer *et al.*, *Industr. Engng. Chem.*, 1954, **46**, 2350.
(3) Pirson & Wick, *Fette u. Seifen*, 1953, 193-4, 361, 793.
(4) Nowak & Ricklung, *Kunststoffe*, 1954, 191 *et seq.*

BIBLIOGRAPHY

Rochow, E. G., 'Introduction to the Chemistry of the Silicones'. Verlag Chemie, 1952.
Noll, W., 'Silicones', Chem. Technologie Bd. 4.
Myron Kin, 'Silicone Resins in Heat Resistant Paints in Organic Protective Coatings', Reinhold, 1953.
Lutzkendorf, W., *Chem. Zeit.*, 1955, 79, 282-89.

International Congress

TWO Britons, Dr. H. E. Z. Gordon of the Battelle Development Co. Ltd., and Dr. S. Wernick, honorary secretary of the Institute of Metal Finishing, London, will officiate as chairmen of two of the eight groups forming the 6th International Engineering Congress to be held in Paris from 4-9 June.

This is the third time that Paris has been chosen for the congress which was originated in 1948 for the purpose of exchanging views on technical subjects of interest to all branches of the mechanical industry. This year the subject chosen for discussion is 'Surface Treatment for the Improvement of Mechanical Properties and For Protection Against Corrosion'.

The registration fee for the congress, which covers attendance at working sessions, receipt of all papers, visits to workshops, evening entertainment and the banquet at Chantilly on 8 June, is Frs. 9,000 (ladies Frs.6,000) which should be paid to the Fédération des Industries Mécaniques et Transformatrices des Métaux, 6e. Congrès, account No. 21584 with the BNCI, agence des Ternes, Paris, VIII, or to the Comote Chèque postal No. 3259-70, Paris. The UK sponsor of the congress is the British Engineers' Association of 32 Victoria Street, London SW1.

New Packaged Boiler

Davey, Paxman Acquire Licence Rights

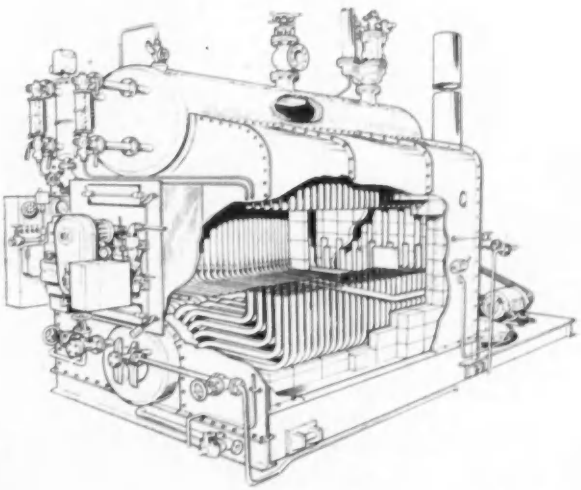
LICENCE to manufacture and sell the Keystone water tube boilers has been acquired by Davey, Paxman & Co. Ltd. of Colchester from the Erie City Ironworks, Pennsylvania. A fully automatic oil burner based on the rotary cup principle is used for the whole range of boilers now being made by Davey, Paxman and this is suitable for operation with fuels having a viscosity up to 3,500 seconds Redwood No.1. The boilers can also be fired with town gas, or a combination burner for oil or gas can be fitted.

The Paxman, packaged K-type boilers are of integral furnace construction, the gases traversing the boiler three times. The range comprises 10 units evaporating from 2,500 lb./hr. to 17,000 lb./hr. of steam from and at 212°F. All boilers in the range are of two drum construction, the tubes being displaced on either side of the centre line, except in the case of the two smallest units. The drums are of all-welded construction and the tubes are 2 in. outside diameter. All boilers are made in two pressure ranges, viz. up to 200 psi and 200-400 psi, but the firm is prepared to consider the construction of boilers having duties and pressures in excess of the standard ranges on request. Non-packaged units are built up to an output of 33,000 lb/hr.

The forced fan daught is provided with a plenum chamber which surrounds the oil burner and is directly connected with the fan unit which is mounted on the main boiler casing. Unlike other boilers of the packaged type, Paxman K-type boilers are fitted with an induced draught fan on the rear of the bed plate and by the use of cross-connected controls between the two fans, balanced pressure can be maintained in the furnace at all times.

Control equipment of the three element type is mounted on a panel bolted directly to the boiler casing. The rate of evaporation is integrated with the pressure-stat and oil flow control valve. Water level is closely maintained by a special type of controller in conjunction with an electrically driven turbo feed pump.

The boilers are fitted with safety devices which ensure the shutting down of the burner in the event of low water, flame failure etc.



A cut away view of the Paxman packaged K-type boiler

UK Sulphuric Acid Returns

Production & Consumption in 1955

FIGURES issued by the National Sulphuric Acid Association Ltd. show that production of sulphuric acid from oleum (chamber, tower and contact) totalled 2,097,146 tons of 100 per cent H_2SO_4 during 1955. Production in 1954 amounted to 2,042,492 tons.

Production during the three months, 1 October to 31 December, 1955, was 547,981 tons, and stock of sulphuric acid and oleum (chamber, tower and contact) dropped from 77,459 tons on 1 October to 73,154 tons on 31 December. Stock on 31 December was, however, still higher than on 1 January, 1955, when it stood at 71,701 tons.

SULPHURIC ACID & OLEUM, 1955
(*Tons of* 100% H_2SO_4)

	Chamber & Tower only	Contact only	Chamber, Tower & Contact
Stock 1 Jan. 1955 ..	29,652	42,049	71,701
Production	582,186	1,514,960	2,097,146
Receipts	90,941	137,960	228,901
Oleum feed	—	5,625	5,625
Adjustments	−567	+1,702	+1,135
Use	356,799	653,433	1,010,232
Despatches	320,522	1,000,600	1,321,122
Stock 31 Dec. 1955 ..	24,891	48,263	73,154
Total capacity represented	800,010	1,783,310	2,583,320
Percentage production	72.8%	85.0%	81.2%

UK CONSUMPTION 1955

Trade Uses	Tons 100% H_2SO_4
Accumulators	10,941
Agricultural purposes	5,035
Bichromate & chromic acid	15,618
Bromine	12,168
Clays (Fuller's earth, etc.)	11,447
Copper pickling	3,127
Dealers	13,795
Drugs & fine chemicals	18,708
Dyestuffs & intermediates	81,461
Explosives	28,865
Export	3,791
Glue, gelatine & size	392
Hydrochloric acid	61,545
Hydrofluoric acid	11,375
Iron pickling (incl. tin plate)	117,574
Leather	5,031
Lithopone	16,818
Metal extraction	4,342
Oil refining & petroleum products	60,595
Oils (vegetable)	11,232
Paper, etc.	7,428
Phosphates (industrial)	617
Plastics, not otherwise classified	34,989
Rayon & transparent paper	260,639
Sewage	11,016
Soap, glycerine & detergents	42,705
Sugar refining	616
Sulphate of ammonia	284,602
Sulphates of copper, nickel, etc.	20,426
Sulphate of magnesium	2,120
Superphosphates	490,996
Tar & benzole	23,231
Textile uses	19,141
Titanium dioxide	231,752
Unclassified	197,189
Total	2,121,327

RAW MATERIALS
Tons

	Pyrites	Spent Oxide	Imported Sulphur	Recovered Sulphur, H_2S & Filter Cake	Zinc Concentrates	Anhydrite
Stock 1 Jan. 1955	155,766	141,953	44,809	8,734	55,613	390
Receipts	512,026	270,460	262,814	25,442	219,523	383,140
Adjustments	+2,147	+4,099	+833	+13	+609	+12,799
Use	457,708	260,870	248,578	24,086	200,399	382,197
Despatches*	8,909	30,675	4,914	1,477	777	—
Stock 31 Dec. 1955	203,322	124,967	54,964	8,656	74,569	14,132

* Including uses for purposes other than sulphuric acid manufacture.

RAW MATERIALS
Tons

	Pyrites	Spent Oxide	Imported Sulphur	Recovered Sulphur, H_2S & Filter Cake	Zinc Concentrates	Anhydrite
Stock 1 Oct. 1955	208,289	126,986	61,313	8,219	67,459	9,835
Receipts	107,304	70,723	66,047	6,417	52,576	117,510
Adjustments	−579	+201	−59	+15	+234	—
Use	108,653	65,409	70,414	5,756	44,923	113,213
Despatches*	3,039	7,534	1,923	239	777	—
Stock 31 Dec. 1955	203,322	124,967	54,964	8,656	74,569	14,132

* Including uses for purposes other than sulphuric acid manufacture.

SULPHURIC ACID & OLEUM
1 October—31 December
(*Tons of* 100% H_2SO_4)

	Chamber & Tower only	Contact only	Chamber, Tower & Contact
Stock 1 Oct. 1955 ..	25,295	52,164	77,459
Production	142,360	405,621	547,981
Receipts	27,265	33,061	60,326
Oleum feed	—	1,689	1,689
Adjustments	−58	−50	−108
Use	97,048	176,272	273,320
Despatches	72,923	267,950	340,873
Stock 31 Dec. 1955 ..	24,891	48,263	73,154
Total capacity represented	198,630	461,480	660,110
Percentage production	71.7%	87.9%	83.0%

UK CONSUMPTION, 1 OCTOBER—31 DECEMBER

Trade Uses	Tons 100% H_2SO_4
Accumulators	3,025
Agricultural purposes	1,057
Bichromate & chromic acid	4,423
Bromine	3,904
Clays (Fuller's earth, etc.)	2,346
Copper pickling	786
Dealers	3,619
Drugs & fine chemicals	4,627
Dyestuffs & intermediates	19,812
Explosives	6,775
Export	1,071
Glue, gelatine & size	94
Hydrochloric acid	15,975
Hydrofluoric acid	2,310
Iron pickling (incl. tin plate)	30,793
Leather	1,343
Lithopone	4,134
Metal extraction	1,206
Oil refining & petroleum products	16,839
Oils (vegetable)	2,742
Paper, etc.	1,897
Phosphates (industrial)	149
Plastics, not otherwise classified	10,345
Rayon & transparent paper	67,049
Sewage	2,369
Soap, glycerine & detergents	9,633
Sugar refining	181
Sulphate of ammonia	74,962
Sulphates of copper, nickel, etc.	6,032
Sulphate of magnesium	282
Superphosphates	134,293
Tar & benzole	5,957
Textile uses	4,947
Titanium dioxide	62,101
Unclassified	52,509
Total	559,587

Oil-From-Coal Scheme Shelved

The Southern Rhodesian Government have temporarily shelved their investigations into the possibility of producing oil from coal, but may resume them when the Kariba hydro-electric project is completed in the next five or six years. The Government's consultants were Powell-Duffryn Technical Services Ltd., who at the time were owners of the Wankie coalfields where the scheme was contemplated. Powell-Duffryn produced plans for an oil-from-coal scheme which would produce about 60,000,000 gallons of petroleum products a year.

C

SCI Symposium

Thirteen Papers on Epoxide Resins

PLASTICS and polymer group of the SCI announce a symposium entitled 'Epoxide Resins, Their Chemistry & Structure in Relation to Their Properties & Applications' to be staged at the William Beveridge Hall, Senate House, University of London from 11 to 13 April.

Chairman of the symposium on the first day will be Dr. J. J. P. Staudinger, Dr. Ing., when the papers to be read will be 'Characteristics of Some Epoxide Resin Systems'; 'Polyepoxide Resin Systems, Their Chemical Reaction & Physical Properties'; 'The Curing Mechanism of Epoxide Resins'; and 'The Polyamide-Epoxy Resin System'.

On the second day, under the chairmanship of Dr. S. Whitehead, M.A., D.Sc., M.I.E.E., F. Inst. P., the titles of the papers to be read will be, 'Some Aspects of the Use of Glass Fibres for the Reinforcement of Epoxide Resins'; 'Electrical Applications of Epoxide Resins Particularly in the Electronics Industry'; 'The Use of Epoxide Resins in Synthetic Rubber Compositions'; and 'Epoxide Resins as Polyvynyl Chloride Stabilizers'.

The chairman on the final day will be Dr. N. J. L. Megson, D.Sc., F.R.I.C., F.P.I., who will also sum-up the symposium at the end. Papers to be read this day are 'The Use of Aniline-Formaldehyde Resins as Curing Agents for Epoxide Resins'; 'Chemical & Spectroscopic Studies of Epoxide Resin Reactions'; 'Some Aspects of the Chemistry of Epoxide Resins in Relation to Applications'; 'The Adhesive Properties of Epoxide Resins'; and 'Epoxide Resins: Their Place in Industry'.

Reprints of all papers will be presented to delegates in summary form by the authors at the symposium. Registration fee for the symposium for members of the SCI is £1 (£3 to non-members).

A dinner for delegates and their guests will be arranged on the evening of the last day, for which an additional charge will be made.

Details may be obtained from the assistant secretary, Plastics & Polymer Group, The Society of Chemical Industry, 56 Victoria Street, London SW1.

Production of crude oil at Kuwait totalled 53,894,068 tons during 1955, compared with 46,969,415 tons for 1954.

Microtechniques

Preparation of Acetyl Chloride

A TYPICAL organic preparation using small scale techniques has been described by P. Sleightholm, M.A., B.Sc., A.R.I.C., of the Technical College, Blackburn.

The particular reaction chosen, the preparation of acetyl chloride, is well known (1) but the method of collection is claimed to present new features.

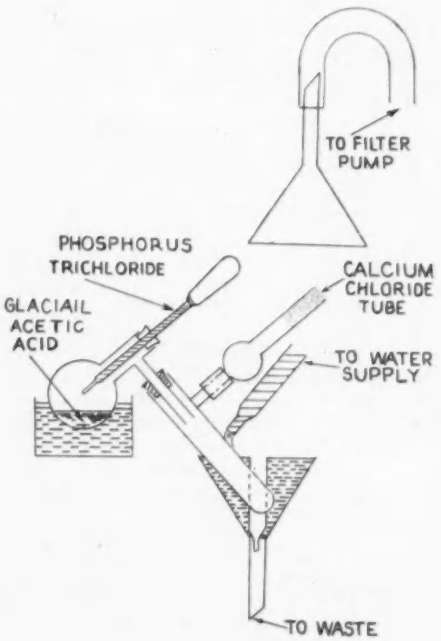
The chlorinating agent used is phosphorus trichloride which is added from a previously charged dropping pipette (2). This obviates the need for a tap funnel. The condensing unit is of a simple type (3) and a Liebig condenser is not required.

To make this condensing unit a four inch length of 10 mm (OD) tubing is heated until it softens in the middle. It is then drawn out till it is about five inches long. When it has cooled it is cut in the middle. One half is inserted in a large filter funnel and serves to provide a constant head device and the other half is used to direct a jet of cold water over the receiving vessel.

The apparatus is assembled as shown in the diagram. Five ml. of glacial acetic acid are placed in the 20 ml. distillation flask and the dropping pipette is charged with 2.5 ml. phosphorus trichloride. The distillation flask is cooled in a cold water bath, a calcium chloride tube is fitted to the side arm of the six by one inch filter tube and the inverted funnel connected to a water pump to act as a fume remover.

The phosphorus trichloride is added slowly a few drops at a time. When all has been added the water bath is warmed, gradually at first, and then to boiling. Water is run over the receiving vessel and all the distillate collected.

If necessary, the crude product is redistilled using the same type of apparatus with a thermometer in place of the dropping pipette and with a smaller filter tube as receiver. The calcium chloride tube is still necessary. The fraction boiling up to 58°C is collected.



REFERENCES

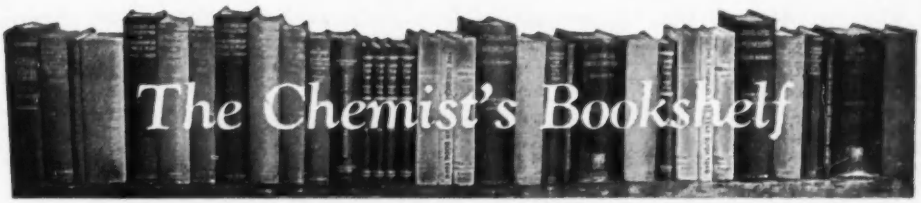
(1) Cohen, J. B., 'Practical Organic Chemistry.' 3rd edition, p. 87.
(2) Cheronis, N. D., 'Technique of Organic Chemistry,' Volume 6 (Micro and semimicro methods) p. 269.
(3) Sleightholm, P., *School Science Review*, 1955, 131, 213.

Canadian Ammonia Plans

QUEBEC Ammonia Co. is to build an $8,000,000 ammonia plant at Varennes, Quebec. Construction of the plant, which will have a daily capacity of 125 tons, is due to start early this spring and should be completed early next year. The plant will produce anhydrous ammonia, nitric acid and fertilizer solutions.

The company is reported to have completed a 10-year contract to supply Du Pont of Canada's ammonia requirements. This contract has enabled Quebec Ammonia to arrange sufficient financing to go ahead with the plant project on which a start had originally been planned for last spring.

Another ammonia plant project—that of Canadian Industries Ltd. at Millhaven, Ontario—is now under construction with completion expected early this summer. It is claimed that this will be the biggest ammonia producer in Eastern Canada with a daily output of 200 tons. The bulk of this output will be used by the company mainly in the production of fertilizers and explosives.



CHEMIE UND TECHNIK DER VITAMINE. By Dr. Hans Vogel, revised by Dr. Heinrich Knobloch. 3rd edition, Volume II. Ferdinand Enke Verlag, Stuttgart. 1955. Pp. 160. DM27.60.

The latest instalment (for reviews of previous parts see THE CHEMICAL AGE, 1951, **64**, 360; 1953, **68**, 639; 1954, **70**, 737; 1955, **72**, 440) of this extensive work is devoted to the water-soluble vitamins biotin (vitamin H) and nicotinamide (vitamin PP).

The first 95 pages are concerned with an exhaustive account of biotin. The history, occurrence, structure, and stereochemistry of the vitamin are described, and five syntheses are detailed. Stereo-specific synthesis of the stereoisomeric biotins is included, with a description of the properties and derivatives of the individual isomers. Methods of detection and estimation are listed. A section is devoted to avidin. The requirement of biotin by organisms, and the effect of a deficiency of the compound are discussed. The pharmacology, biosynthesis, biological breakdown and reaction towards certain fatty acids are covered, as are the role of biotin in metabolism, and biotin antagonists. An exhaustive patent list is provided, and over 400 references cover the literature up to 1955.

The remaining pages are devoted to nicotinamide, the account to be continued in the next instalment. The history, occurrence, constitution, synthesis, properties, derivatives, detection, estimation and biological importance of nicotinic acid and its amide are described. A lengthy section is devoted to diphosphopyridine nucleotide (cozymase, coenzyme I, code hydrase I), and to triphosphopyridine nucleotide (coenzyme II, coferment). Modern theories of the biosynthesis of nicotinamide are discussed.

Once again the readable style has been maintained, and errors are remarkably few. The work continues to be of a high standard of accuracy, and the print, paper and formulae are pleasing. Although probably two more parts have yet to appear, it is safe to say at this stage that the book will be in demand by biochemists and others interested in all aspects of vitamin chemistry. The appearance of the work in parts enables the subject matter to be up-to-date, and a supplement will appear finally, to bring the earlier parts up to the minute.—A. R. PINDER.

CHEMICAL ENGINEERING. Vol. II (Unit Operations). By J. H. Coulson & J. F. Richardson. Pergammon Press, London. 1955. Pp. xvi + 975. 60s.

All who read the first of Professor Coulson's and Dr. Richardson's two volume work entitled 'Chemical Engineering' will have been waiting eagerly for the appearance of the second volume. This has now been published and completes the detailed treatment of unit operations which was begun in the first volume with fluid flow, heat transfer and humidification. The special interest in the appearance of the second volume lies partly in the fact that the particular unit operations covered here are those which, while not controversial in themselves, have been the subject of much argument as to the best manner of their presentation.

The second volume deals essentially with the physical principles involved in the design of chemical plant and their application to such designs. Yet the first point which must be stressed after reading both volumes is the complementary nature of the two parts. It is essential to consider the book as a whole in order fully to appreciate its worth. When one does this, much of the apparent anomaly of the order of treatment and presentation disappears. In this volume the unit operations are divided into sections which are classified by the main design fea-

ture of each operation. Thus the first section deals with those operations which involve the flow of fluids through granular beds and packed columns and includes chapters on filtration and centrifuging. These are distinguished from the operations of sedimentation and fluidization which are specialized aspects of the phenomena involving relative motion between a fluid and solid particles. In each chapter a brief descriptive introduction leads to a theoretical analysis of the mechanism of the operation and to the application of derived relationships to the design of equipment which are illustrated with worked examples. Particular emphasis is placed where possible on the fundamental basis of relationships used in design. This is well exemplified in the third section which covers the principal mass transfer operations—leaching, distillation, gas absorption and extraction.

A pleasing feature from a teaching point of view is the stress placed by the authors on the basic identity of all stagewise mass transfer operations. This section is followed by one in which evaporation, crystallization and drying are treated, and the final section covers the operations of size reduction classification and mixing. This is an example of the reversal of juxtaposition generally used since these operations are usually treated side by side with those of sedimentation and fluidization. However, this again gives point to the argument that the book should be read and used as a whole since the order used is logical from the point of view of the development of each section from first principles which the authors have followed. Despite this emphasis on fundamentals the authors have not left the student 'in the air' when it comes to the design of actual equipment and a feature of the book is the many diagrams and data giving up to date information on plant, which are supplemented by extensive references at the end of each chapter.

The authors have resisted the temptation to devote undue space to any one operation at the expense of others and have achieved a nice balance between sections. The level of this text is sufficient to take the student up to honours degree standard and the research worker as well as the practising engineer will find the fundamental treatment in his own field rewarding and worthy of study. The authors are to be complimented for maintaining the very high standard set by the previous volume and for completing a valuable addition to the chemical engineering literature which is all the more welcome because of its relatively modest price. Finally may we also compliment the reviewers of the first volume who were almost unanimous in their plea for the addition of problems for the student, and who now find their request granted in this second volume.—D.C.F.

BIOCHEMISTRY—AN INTRODUCTORY TEXTBOOK. By Felix Haurowitz. John Wiley & Sons Inc., New York. Distributed by Chapman & Hall, London. 1955. Pp. xvi + 485. 54s.

The text covers the whole of biochemistry at an introductory level. The author states that the book is primarily intended to form the basis of a one year course in biochemistry for students mainly interested in bacteriology, chemistry, physiology and zoology. In these cases one presumes that it would be supplemented by lecture courses. However, in this country students of chemistry, zoology and botany would be unlikely to receive such a course of lectures and the book must be considered primarily from the point of view of an individual having to read it without previous knowledge of the subject.

Since the text covers such a wide range of topics a great deal of condensation of subject matter has been made. In general it appears that the sections on intermediary metabolism have suffered by this condensation. It would be difficult for the reader to understand the breakdown of carbohydrates in the dozen pages which are devoted to this topic. However, the author's simultaneous treatment of the chemistry and metabolism of each of the main body constituents lends itself to easier reading. Also the inclusion of chapters on replacement reactions and energetics and the transfer of energy in biochemical reactions is quite unique in such a general text.

For the individual who has some previous knowledge of biochemistry, this text would prove valuable, covering as it does such topics as photosynthesis, carotenoids, steroids and hormones. In addition it gives at the end of each chapter a list of books for general reading and a series of review articles which permit the reader to obtain a good background in a very wide range of aspects of biochemistry.—K.R.R.

HOME

Research Laboratory Planned

Thorium Ltd. plan to build a chemical research laboratory at their works in Uphall Road, Ilford, Essex.

New Laboratory

The scientific department, Scottish Division, National Coal Board will shortly take over a modern laboratory at Corstorphine, Edinburgh.

Price Increase

As the result of increased production costs Bowmans Chemicals Ltd., of Widnes, Lancashire, have raised the price of dark lactic acid, 44 per cent by weight, by ¼d per lb. The increase is effective from 1 February.

Name Changed

Mr. J. H. Bentley, chairman and managing director of Varley Pumps & Engineering, the British subsidiary of the Food Machinery & Chemical Corp. of California, announces that the company's name has been changed to Varley F.M.C.

W. J. Fraser Contract

W.J. Fraser & Co. Ltd., chemical engineering contractors, of Harold Hill, Romford, Essex, have been awarded a contract to engineer and construct a complete, large-scale Lube oil blending and packaging plant at Durban, for the Shell Company of South Africa. Fraser's South African associates, Fraser & Chalmers (SA) (Pty.) Ltd., will play an important part in the project.

£500,000 Oxygen Plant

The British Oxygen Co. Ltd., Bridgewater House, Cleveland Row, London SW1, are constructing an oxygen plant on a 12-acre site at Lackenby, near Middlesbrough, at an estimated cost of £500,000.

Chemical Training Awards

On 31 January the Lord Mayor of Birmingham, Alderman A. L. Gibson, presented 19 certificates to men from Birmingham and the Black Country who have qualified for a training scheme organized by the Association of Chemical & Allied Employers. The idea of the scheme is to introduce a new class of operator into an industry previously looked upon as 'unskilled'. The qualified men will receive 9d an hour above the basic rate of pay for the industry, which will be paid in stages.

Bigger Premises

Kaylene (Chemicals) Ltd., are having extensions erected at their premises in Waterloo Road, London NW2.

Symposium & Exhibition

The Institution of Chemical Engineers and Birmingham University Chemical Engineering Society will hold a joint symposium and exhibition entitled 'Modern Techniques in Chemical Plant Construction' on 21 March at Birmingham University, Edgbaston, Birmingham 15.

Sir Henry Tizard in Train Crash

Among the passengers taken to St. Thomas's Hospital, London, for treatment after a Portsmouth Harbour train hit the buffers at Waterloo on 31 January was Sir Henry Tizard, G.C.B., A.F.C., F.R.S., former chief scientific adviser to the Government. Sir Henry, who is 70, was treated for bruises and shock.

Heat Treatment Practice

The metallurgy (general) division of the British Iron & Steel Research Association is organizing a conference on heat treatment practice, to be held at Ashorne Hill, Leamington Spa, on 5 and 6 of June. Emphasis will be given to the consideration of practical problems connected with the heat treatment of steel products, from small engineering components to large forgings. Details of the programme and a synopsis of the papers to be delivered will be published in April.

Silicones for Industry

An interesting exhibition, 'Silicones for Industry', is being held in London at The Tea Centre, Lower Regent Street, until 18 February by Midland Silicones Ltd. Silicone rubber, electrical materials, fluids, greases, release agents and paints are being demonstrated daily for the benefit of possible users including the general public. There is a special section devoted to a display of consumer products containing silicones, and special emphasis is being placed, upon the new DRI-Sil silicone finish for textiles. This is said to give resistance to water-borne and greasy stains and abrasion as well as providing durability, increased lustre and showerproofing qualities.

• OVERSEAS •

Turkish Oil Refinery

Construction of the Batman Oil Refinery in S.E. Anatolia has been completed, and from 1 January, 1956, Turkish petrol has been on sale on the market. During 1956, the refinery will produce 50,000 tons of high-grade petrol, 16,000 tons of heavy oils, 110,000 tons of fuel oil, and 61,000 tons of asphalt.

US Lead Consumption

Fourteen per cent of all lead consumed in the US in October was used in chemicals (including tetraethyl fluid) and 11 per cent in pigments. Total lead consumption during the month was 113,700 short tons, three per cent more than the previous month and 26 per cent more than in October 1954.

Israel Ammonia Plant

The I£7,000,000 ammonia plant of Israeli Fertilizers & Chemicals Co. has now commenced operations, the company announced in Haifa recently. The plant will convert nitrogen from the air into ammonia. Built in seven sections, the plant took two years to be completed. Most of the equipment came from the US with some provided out of German Reparations funds.

Kuwait Oil Refinery

Kuwait Oil Co. is planning an extension to its refinery at Mina al Ahmadi which will increase the existing plant capacity of 1,400,000 tons to a total of 8,500,000 tons a year. The project includes two crude distillation units of 80,000 barrels per day capacity each with a gasoline stabilizer.

Haifa Chemical Output

The Haifa chemical plant of Israeli Fertilizers & Chemicals Co. announces a record total production of 100,000 tons for 1955, compared with 76,000 tons for 1954.

Canadian Chemical Survey

Demand is expected to hold firm for industrial chemicals in Canada for the first half of 1956, reprts the Canadian Association of Purchasing Agents who have just completed a survey. Anhydrous ammonia production, the survey reports, is expected to increase later this year with prices tending to decrease. Sulphuric acid demand is expected to be met from two new plants in Ontario and one in Quebec which are under construction.

NZ Salt Harvest

A record harvest is expected this year from the solar salt works at Lake Grassmere, near Blenheim, New Zealand. Salt is already settling heavily in the concentrating pools, and it is thought that last season's yield of 8,000 tons may be trebled. Harvesting was expected to begin about the middle of January.

UK Firm's Indian Contract

Costain-John Brown Ltd. has been appointed by the Government of India as adviser on the types of heavy water plant that should be installed to meet forward commitments of the Indian atomic energy programme. The heavy water plant constitutes a substantial portion of the Indian Government's projects running into many millions of pounds.

Expansion in NZ

Townson & Mercer (NZ) Ltd., are planning a complete coverage of New Zealand for selling interchangeable laboratory glassware manufactured by Quickfit & Quartz Ltd., of Stone, Staffs, England. At Auckland, Townson & Mercer employ an English trained technician to repair and service Q & Q installations.

Trans-Canada Pipe Line

Tennessee Gas Corporation of Houston, Texas has just acquired a full partnership in the company planning to build a natural gas pipeline from Alberta, in Canada's middle west, to the east. The company is Trans-Canada Pipe Lines Ltd., and it plans to construct and operate a 2,200 mile pipe line. The other two companies concerned in the project are Canada Delhi Petroleum Ltd., original founders of Trans-Canada, and the sponsors of Western Pipelines Ltd.

Union Carbide Silicones Division

The Union Carbide & Carbon Corp. has formed a silicones division to take over the responsibility for the development, manufacture, and sale of silicone products. The division will assume all responsibilities in the field of silicones previously handled by Linde Air Products Co., and silicones, which have been marketed under the Linde trade-mark, will in future be called Union Carbide silicones.

· PERSONAL ·

DR. J. R. NICHOLSON, of the Ardil home sales control department, ICI, Dumfries, has left the Nobel division to become records and research manager, ICI southern region. He succeeds DR. G. ARMSTRONG. While at Dumfries Dr. Nicholson took a very active part in the promotion of Ardil.

MR. G. F. CUMMING, M.B.E., T.D., manager of Harrisons & Crosfield's chemical division and director of Durham Raw Materials Ltd, an associated Harrisons & Crosfield company, has been appointed to the board of Dillons Chemical Company Ltd, Montreal, an associated company of Harrisons & Crosfield (Canada) Ltd.

Also appointed to the board of Dillons Chemical Company Ltd. was MR. G. O. PEAKE, O.B.E., A.C.A., secretary of Harrisons & Crosfield Ltd. and of Durham Raw Materials Ltd.

MR. BERT CREMERS, vice-president of Wyandotte Chemicals Corp., Wyandotte, Mich., was elected president and chairman of the board of the Chlorine Institute Inc., trade association of the chlorine manufacturing industry, at the Institute's recent annual meeting in New York. He succeeds MR. R. WOLCOTT HOOKER, senior vice-president of the Hooker Electrochemical Company, Niagara Falls, NY. MR. WILLIAM P. DRAKE, president of the Pennsylvania Salt Manufacturing Co., Philadelphia, was named vice-president, and MR. ROBERT T. BALDWIN was re-elected secretary-treasurer.

PROFESSOR G. B. B. M. SUTHERLAND, Sc.D., F.R.S., professor of physics and director of the biophysics research centre in the University of Michigan, has been appointed director of the National Physical Laboratory. It is expected that he will take up the appointment in September. Professor Sutherland succeeds SIR EDWARD BULLARD, Sc.D., F.R.S., who retired on 31 December. The appointment of DR. R. L. ROSE-SMITH, C.B.E., D.Sc., M.I.E.E., as acting director has also been announced. Professor Sutherland was educated at the Morgan Academy, Dundee, and St. Andrew's University. During the early part of the war he was assistant to the director of scientific research at the Ministry of Supply. In 1941 he was made head of a group carrying out research at Cambridge on the structure of hydrocarbons, work leading to improved avaition fuels. In 1947 he became reader in spectroscopy at Cambridge and in 1949 was appointed to his present post at Michigan. He is a leading authority on infra-red spectrum analysis but in recent years has developed especial interest in the field of biophysics. He was elected a Fellow of the Royal Society in 1949.

MR. R. J. BROWN, manager, export sales department, Nobel Division, ICI headquarters, since 1942 has been appointed a director of ICI (Export) Ltd.

MR. H. E. F. PRACY, B.A., M.I.CHEM.E., F.INST.P., was re-elected chairman of the North Western Branch of the Institution of Chemical Engineers at the annual general meeting on 28 January. MR. H. E. CHARLTON, M.I.CHEM.E., M.INST.F., F.INST.PET., was elected vice-chairman in succession to MR. P. K. STANDRING, B.SC., F.INST.PET., MR. G. A. TURNER, B.SC., A.M.I.CHEM.E., DIP. CHEM. ENG., was elected honorary secretary in place of DR. J. S. HUNTER, PH.D., M.I.CHEM.E., and MR. J. M. WISHART, B.SC., F.R.I.C., M.I.CHEM.E., was re-elected honorary treasurer. DR. J. F. C. GARTSHORE, PH.D., M.I.CHEM.E., was re-elected to the committee. New members of the committee are: MR. D.G. BAGG, B.SC., F.R.I.C., M.I.CHEM.E., MR. A. H. NISSAN, M.I.CHEM.E., MR. A. J. CARTER, B.SC., F.R.I.C., A.M.I.CHEM.E., and MR C. S. H. MUNRO, B.SC., D.I.C., A.R.C.S., A.M.I.CHEM.E.

Will

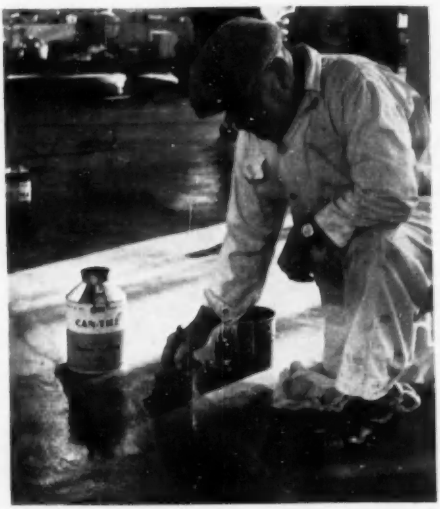
The late MR. JOHN RITCHIE, chemical manufacturer, of 82 Blairbeth Road, Burnside, Glasgow, left £105,066 (duty £50,165).

Obituary

The death was announced on 28 January of MR. CHARLES HERBERT BURTON, aged 62, of Chickney Hall, Broxted, Essex, after a long illness. Mr. Burton was a director of William Burton & Sons (Bethnal Green) Ltd., when that company was absorbed by the Laporte group. He was elected a director of the parent company, and later became the vice-chairman of Laporte Industries Ltd. in 1947.

MR. JAMES TODD, chairman and director of Goodall, Bates & Todd Ltd., Gateshead, has died at Newcastle-uponTyne, aged 80. Trained on Clydeside, Mr. Todd entered the lubricating trade in Newcastle in 1902. He served on the Oil Distributors Emergency Council during the war and at one time was president of the British Lubricating Oil & Grease Research Organization and a council member of the National Lubricating Oil & Grease Federation.

MR. J. R. W. MAXWELL, director, Nobel division, ICI, for six years until he retired in 1946, has died. He was successively assistant works manager at Linlithgow, works manager at Ardeer, and chief engineer to the explosives group, joining the board in 1940. He took a leading part in the design and erection of the various factories within the division, retiring in 1946.



Applying a coating of Can-tile

Show Timed to Overlap

FOLLOWING the success of the first International Instrument Show, which they staged in their offices at Union Street, London SE1, last year, B & K Laboratories Ltd. will hold the 1956 event in larger premises at Denison House, Vauxhall Bridge Road, Victoria, London, from 7 to 18 May.

The show, which will display electronic equipment and components from both British and overseas manufacturers, is timed to overlap the Physical Society's Exhibition which confines its exhibits to those of British manufacture. This planned overlap enables visitors to the Physical Society's Exhibition to see electronic equipment and components from world-wide sources.

This year the products will range from audio to microwave equipment covering laboratory, test and industrial aspects. Tickets can be obtained from the organizers, B & K Laboratories Ltd., at 59-61 Union Street, London SE1.

Quick Drying Protection

A RUBBERIZED surfacing material for use on concrete, stone and bituminous floors, roofs and walls was recently demonstrated to the trade and technical press by Dohm Ltd., 167 Victoria Street, London SW1. In the presence of the journalists a coating of the material, known as Can-tile, was applied to the concrete floor of a garage and allowed to set for only slightly more than 40 minutes before several automobiles and vans were run over the surface. The floor was then scrubbed with warm water and a well-known detergent to show that the marks on the surface were only removable dirt and that the film had dried.

A tough elastic plastics film, Can-tile is suitable for either indoor or outdoor use and it dries exceptionally quickly. It can be brushed or sprayed and is touch-dry under normal conditions in 15 to 20 minutes. It is completely waterproof and frost proof, impervious to oil and highly resistant to most alkalis and acids. It is available in tile red, battle grey or white and for particular jobs colours can be specially mixed. One gallon is said to cover 30 to 40 square yards and costs only 68s in 1 gallon tins or 67s a gallon in five gallon drums.

Publications & Announcements

ECONOMIC and technical aspects of fuel saving are discussed in ten articles in the 1956 edition of the annual 'Fuel Economy Review', published by the Federation of British Industries, price 5s post free. The review, now in its 34th year, also contains explanations of the Government Loan Scheme for fuel-saving equipment and of the work of the National Industrial Fuel Efficiency Service. An article on the generation of energy from nuclear fission, by Sir John Cockcroft, director, Atomic Energy Research Establishment, Harwell, refers to the estimate that nuclear power will be able to do the work of 40,000,000 tons of coal a year by 1975. 'However', adds Sir John Cockcroft, 'our forecast requirements for energy at this date are higher by 100,000,000 tons a year than our present level. There will therefore still be a sizeable gap to fill by fuel economy and by importation of oil.'

* * *

A COMPREHENSIVE work of 1,600 pages which includes 65,000 references, the 74th edition of the 'Electrical Trades Directory, The Electrical Journal Blue Book,' published by Benn Brothers Ltd., price £3 3s, is now available from Bouverie House, 154 Fleet Street, London EC4. The edition has been expanded to describe the main products and developments of the industry, together with the names and addresses of the manufacturers. An extremely useful feature is the trades name section which contains more than 5,700 names of patented and branded articles. Nearly 300 new names have been added to the list of manufacturing and other companies, which are indexed under classified sections.

* * *

A NEW journal *The Inspection Engineer* (incorporating *Quality Control*) is being published by the Institution of Engineering Inspection, 28 Victoria Street, London SW1. In a foreword to the first edition Sir Walter Puckey, past president of the Institution of Production Engineers, says: 'Too many products are to-day badly designed and made (in detail if not in outline). During the last few days I have had these experiences—a clip on a newly delivered office appliance fell off the first day; the rubber foot of a TV converter broke away in less than a week; the lock flap of an expensive briefcase snapped off after a few weeks' use'. The standard of detail design was lower than it should be and as many products had been damned by detail troubles as by major dissatisfactions. Quality control meant more than inspection, said Sir Walter. It meant that constant attempts were made to build quality into the product by ensuring that consistent production conditions and material standards. The subjects covered in this first issue include, 'The Collection, Presentation and Study of Inspection Data,' 'Problems in Organization of Statistical Quality Control' and 'Atomic Energy and Some of Its Applications'.

* * *

APPROXIMATELY 1,400 products are listed in a brochure recently published by Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, NY. Union Carbide and Carbon Corporation subsidiaries in the US together with associated companies overseas and foreign sales are handled by Union Carbide International Company. A summary of the products of this group includes alloys and metals, a wide range of organic chemicals, industrial gases and carbide, and plastics.

* * *

PUMPS designed to handle all fluids having reasonable lubricating properties are manufactured by Hamworthy Engineering Ltd., Fleets Corner, Poole, Dorset. These so-called Hamworthy Y pumps are made in 13 sizes and will deliver between 46 and 3070 gallons per hour at varying pressures according to the viscosity of the fluid being pumped. The pump is straightforward with a minimum of working parts and the mechanism consists of a pair of rotors of the straight spur gear type, the shafts of which are mounted on needle roller bearings entirely lubricated by the pumped fluid. A relief valve is fitted which allows the fluid to by-pass from the delivery to the suction side if the pressure rises more than 10 per cent above the normal working pressure. Where it is necessary to vary the delivery pressure a calibrated valve is fitted which allows the pump to be adjusted while in operation. On all except the smaller models the pump casing is steam jacketed.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

ELECTRO-CHEMICAL RESEARCH LABORATORIES LTD. London, W.—30th December, £4,000 mortgaged to North-West Bldg. Soc.; charged on Hutchins Barn, Knotty Green, Penn (Bucks.). *----. 31st December, 1953.

GRAVINER MANUFACTURING CO. LTD. London, SW, fire extinguisher manufacturers &c.—2nd January, charge, to N. G. Bennett, Staines, securing all moneys which the chargee may be called up to pay under a certain guarantee; charged on leasehold 16, 17 & 18 (part) Stanmore ct, St. James's st, S.W.1. *Nil. 3rd November, 1954.

SOLWAY CHEMICALS LTD., Whitehaven.—2nd January, two supplemental deeds respectively supplemental to & varying the terms of debs. dated 16th June, 1952 & 13th October, 1954; charged on property ets. comprised in original deeds. *£2,300,000. 24th May, 1955.

WESTLYN PLASTICS LTD. (formerly Arthur Craxford Ltd.) Sheffield.—2nd January, £2,000 debentured to G.W. Hurst, Sheffield; general charge. *Nil. 27th May, 1955.

Receiverships

STEWART BROTHERS (LONDON) LTD., chemical, mechanical, electrical & general engineers etc., 'Barnsfield', Albert Road North, Reigate, Surrey. JAMES WOOD, of 34 Clements Lane, London EC, was appointed receiver and manager on 10 January, 1956, under powers contained in debenture dated 6 June, 1951.

Satisfactions

NORMAN EVANS & RAIS LTD. Manchester, colour manufacturers &c.—Satisfaction 14th January, that all property comprised in a mortgage registered 9th February, 1944 (Outwood-ho, Cheadle Bulkeley, Handforth), has been released from the charge.

Increases of Capital

BRENTFORD SOAP CO. LTD., Brent Works, Brentford, Middlesex, increased by £50,000, in 47,000 'A' ordinary shares of £1 and 60,000 'B' ordinary shares of 1s, beyond the registered capital of £25,000.

SOLWAY CHEMICALS LTD., Ladysmith Works, Kells, Whitehaven, Cumberland, increased by £50,000 in £1 ordinary shares, beyond the registered capital of £650,000.

New Registrations

Merchant Chemicals Ltd.

Private company (560,778). Capital £1,000 in £1 shares: To carry on the business of dealers in, importers and exporters of chemicals of all kinds etc. Subscribers (each with one share): Frances B. Woolf and Ronald F. Meek, of 80 Wimpole Street, London W1. Registered office: 80 Wimpole Street, London W1.

Company News

McKechnie Brothers Ltd.

Particulars of an offer for sale were advertised on Monday 6 January of 300,000 'A' ordinary shares of £1 each at 55s per share in McKechnie Brothers Ltd., manufacturers of non-ferrous metals and chemicals, of Widnes and Birmingham. The company's principal products include, at Widnes, sulphate of copper, lithopone, electrolytic copper cathodes and electrolytic copper powder, and titanium sponge, and at Birmingham, extruded rods and sections in brass bronze, aluminium bronze, nickel silver and copper, non-ferrous ingots, stampings and chill cast bars. Average annual profit of the group over the last 10 years, which included exceptionally high results in 1951 and 1952 and a contraction in 1953 owing to fluctuation in metal prices, was £1,187,401. Although the trading results for the first five months ended 31 December 1955, compare favourably with the corresponding period of the previous year, the directors expect some diminution in profit margins owing to rising manufacturing costs.

Next Week's Events

MONDAY 13 FEBRUARY

SCI (Yorkshire Section)

Leeds: Chemistry Lecture Theatre, The University, 7 p.m. 'The Development of Industrial Toxicology' by J. C. Gage, B.Sc., Ph.D., F.R.I.C.

TUESDAY 14 FEBRUARY

SCI (Chemical Engineering Group)

London: Geological Society, Burlington House, Piccadilly W1, 5.30 p.m. 'Manufacture of Phosphorus' by F. B. Shepherd.

Society for Analytical Chemistry

London: Meeting Room of the Chemical Society, Burlington House, Piccadilly W1, 6.30 p.m. 'A Comparison of Three Highly Sensitive Polarographs' by Dr. D. F. Ferrett, D.Phil; G. W. C. Milner, M.Sc., F.R.I.C.; H. I. Shalgosky, B.Sc., A.R.I.C.; and L. J. Slee, B.Sc.; 'Polarography of the Dithionite (Hydrosulphite) Anion & Some Related Oxyacids of Sulphur' by W. Furness, B.Sc., Ph.D., F.R.I.C.; 'The Polarographic Determination of Uranium in Ores' by H. I. Shagolsky, B.Sc., A.R.I.C.

WEDNESDAY 15 FEBRUARY

Institute of Fuel

Chester: Grosvenor Hotel, 7.30 p.m. 'Combustion of Liquid Fuels' by G. J. Gollin, M.A., M.Inst.F., M.I.Mech.E.

SCI (Newcastle Section)

Newcastle: King's College, 6.30 p.m. 'Chemistry & Architecture' by T. W. Parker, M.Sc., Ph.D.

Institute of Fuel

London: Institution of Civil Engineers, Great George Street SW1, 5.30 p.m. 'The Oil From Coal Project of the South African Government' by P. E. Rousseau, M.Sc., M.I.Chem.E., F.Inst.P.

RIC (London Section)

London: Institute of Metals, 4 Grosvenor Gardens SW1, 6 p.m. 'Some Properties & Reactions of the Enzyme Peroxidase' by B. C. Saunders, M.A., Ph.D., Sc.D., D.Sc., F.R.I.C.

THURSDAY 16 FEBRUARY

The Chemical Society

London: Rooms of the Society, Burlington House, Piccadilly W1, 7.30 p.m. Meeting for the reading of original papers.

Bristol: Chemistry Department, The University, 5.15 p.m. 'Some Aspects of Research in the Glass Industry' by W. J. R. Merren.

Textile Institute

Cardiff: The University, 7.15 p.m. 'Dry Cleaning' by E. J. Davies, M.Sc.

SCI (Liverpool Section)

Liverpool: Senate Room, The University, 6.30 p.m. 'The Establishment & Administration of Food Standards in Jamaica' by L. H. Greenwood Barton, B.Sc.

SCI (Road & Building Section)

London: Institution of Engineers, Pepys' House, Rochester Row SW1, 6 p.m. 'Rubberized Bituminous Materials & Their Use

[continued on page 410

Next Week's Events

continued from page 408

in Road Construction' by W. D. Parker, B.Sc., and W. D. C. Walker.

FRIDAY 17 FEBRUARY

The Chemical Society

Glasgow: Royal Technical College, C 1, 7 p.m. 'Some Recent Developments in the Chemistry of the Vitamins D' by Professor B. Lythgoe, M.A., Ph.D.

Newcastle: King's College, 5.30 p.m. Tilden Lecture, 'Recent Progress in the Chemistry of Peptides' Dr. G. W. Kenner, M.Sc.

SCI (Fine Chemicals Group)

London: Chemistry Lecture Theatre, King's College, Strand WC2, 7 p.m. Reading of original papers by members.

Bradford Chemical Society

Bradford: Technical College. Two-day Symposium on 'Radiochemistry' and an exhibition of radiochemical and chemical apparatus. Friday, 7 p.m.; Saturday, 9.30 a.m.

DSIR Appointment

PROFESSOR H. W. Melville, F.R.S., Mason Professor of Chemistry at the University of Birmingham, has been appointed to the post of Secretary to the Committee of the Privy Council for Scientific and Industrial Research in place of Sir Ben Lockspeiser, K.C.B., F.R.S., who retires of 10 March. Professor Melville will take up the new post in August.

Physical chemistry is Professor Melville's chief scientific interest. He is 47 years old and was educated at the George Heriot's School, Edinburgh, the University of Edinburgh, and Trinity College, Cambridge.

He was for some time assistant director of the colloid science laboratory, Cambridge, and on the outbreak of war he went to the Ministry of Supply as scientific advisor to the chief superintendent of chemical defence. Later he became superintendent of the radar research station. Meanwhile he had been elected a Fellow of the Royal Society and had been appointed to the chair of chemistry at Aberdeen, where he remained till 1948, when he took up his present post at Birmingham.

Apart from his academic work Professor Melville has been a member of various scientific and industrial bodies including: advisory council, Department of Scientific and Industrial Research; chemistry research board, Department of Scientific and Industrial Reasearch; Ministry of Supply, scientific advisory council, and advisory council, Ministry of Fuel and Power.

Market Reports

LONDON.—The chemicals market has been without any outstanding feature during the past week, the volume of trade being about average for the period. A fair enquiry for new business has been reported mainly for the routine industrial chemicals, and the call for deliveries against contracts has been up to schedule. Most prices are unchanged at recent levels, and a firm tone persists in most sections of the market. Titanium oxide has been advanced as from 1 February, the standard commercial grade (rutile) now being quoted at £172 per ton. Conditions on the coal-tar products market are quiet, but the output of most items has already been covered by forward bookings.

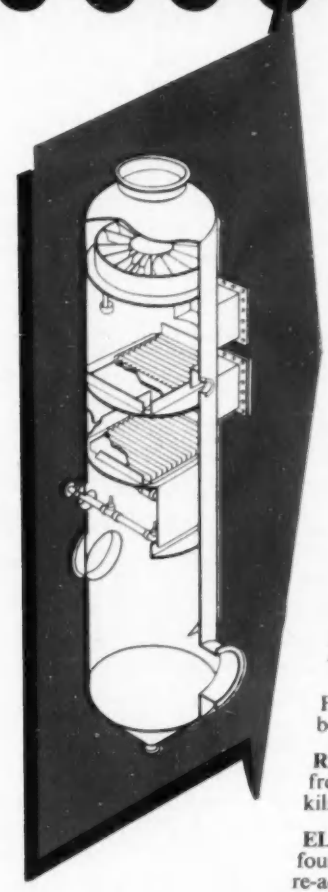
MANCHESTER.—Reasonably satisfactory trading conditions have been reported in almost all sections of the Manchester market for heavy chemical products during the past week. Deliveries under contract are being taken up in good quantities by leading consumers, and a fair number of enquiries from home users as well as from shippers continue to circulate. Quotations are maintained pretty well throughout the range. Fertilizer materials are meeting with a better demand, and with an odd exception ready outlets are being found for the by-products, both light and heavy.

GLASGOW.—Business has been rather quieter during the past week in most sections of the industry, although towards the latter part of the week a little improvement can be reported. No important changes in prices have taken place but some slight increases are being made. There is still a good volume of export enquiries being received, with satisfactory results.

The Bureau of Mines, a department of the US Interior, reports that improved metallurgical techniques in the titanium metal industry last year resulted in the manufacture of titanium sponge of a higher quality, record production, and price reductions of titanium sponge-metal and mill products.

PEABODY

Gas Scrubbers



for **DUST REMOVAL**

PURIFYING GASES

PRODUCT RECOVERY

ABSORPTION

STRIPPING

PREVENTION of ATMOSPHERIC POLLUTION

For more than 20 years Peabody Gas Scrubbers have been in world-wide service—

RECOVERING FINELY-GROUND PRODUCTS from exhaust gases of rotary and spray dryers, lime kilns, furnaces and mills.

ELIMINATING NUISANCES—fly ash, lime dust, foundry shake-outs, incinerator gases, pickle tank fumes, re-action vessels and other gaseous emissions.

Pilot Plant units are available for test purposes

CLEANING GASEOUS FUELS, particularly blast furnace and producer gas.

TREATING GASES for processing, such as SO_2 from ore roasters and CO_2 from lime kilns and boilers.

WRITE FOR BULLETIN LH 203-B

REG'D TRADE MARK

PEABODY LTD., PEABODY HOUSE, 300, VAUXHALL BRIDGE ROAD, LONDON, S.W.1

AUSTRALIA, BELGIUM, FINLAND, FRANCE, HOLLAND, INDIA, ITALY, NORWAY, PAKISTAN, SOUTH AFRICA, SWEDEN

PEABODY ENGINEERING CORPORATION, NEW YORK 36, N.Y., U.S.A.

Specialists in the manufacture of all types of combustion equipment, direct-fired air heaters, gas scrubbers, coolers and absorbers

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications o Vacancies Order, 1952.

A LEADING commercial firm in Colombo, Ceylon, with Head Office in London requires CHEMIST aged 23-27 for analytical laboratory in Colombo. Minimum qualifications required are a B.Sc. degree or the A.R.I.C. Experience in fertiliser, foliar and soil analyses together with a knowledge of agricultural chemistry, ferrous and non-ferrous analyses advantageous but not essential. Initial salary according to age, qualifications and experience but minimum including allowances of Rs. 16,800 (£1,260) per annum with generous increases in salary. Annual bonus in addition rising from not less than £150 per annum. All medical expenses paid. Up-to-date contributory pension fund based upon retirement at 55. Clothing allowance of £100 and first-class passage paid. Periodic furlough on full pay with passages paid. Progressive post with good prospects. Apply, stating qualifications and experience to BOX FE/16 C/O 95 BISHOPSGATE E.C.2.

ANALYTICAL CHEMISTS. required by THE POWER GAS CORPORATION LTD., Stockton-on-Tees. Applicants should be below 35 years of age and have had experience of Inorganic Analysis and preferably be of H.N.C. standard. Permanent and pensionable positions. Salary according to qualifications and experience. Application forms from STAFF PERSONNEL DEPARTMENT at the above address.

FOR SALE

CHARCOAL, ANIMAL AND VEGETABLE horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—**THOS. HILL-JONES, LTD., "INVICTA" WORKS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL-JONES, BOCHURCH LONDON." TELEPHONE: 3285 EAST.**

ONE OVAL-SHAPED DISINFECTOR by Manlove & Alliott. Inside measurements, 30 in. by 50 in. high by 7 ft. long, steam jacketed, with hinged door each end. 30 lb. p.s.i. pressure. £80. **THOMPSON & SON (MILLWALL) LTD., LONDON, E.14 (TEL. EAST 1844).**

RUDEKA 501 Double Acting Centrifugal Grinding and Pulverising Machine for sale. For a degree of fineness suiting materials such as pigment, salts, resins, spices, carbon, graphite, phosphates etc. Motor driven 3 phase. Output 231 lbs pepper per hour. Photo, **F. J. EDWARDS LTD., 359, EUSTON ROAD, N.W.1.**

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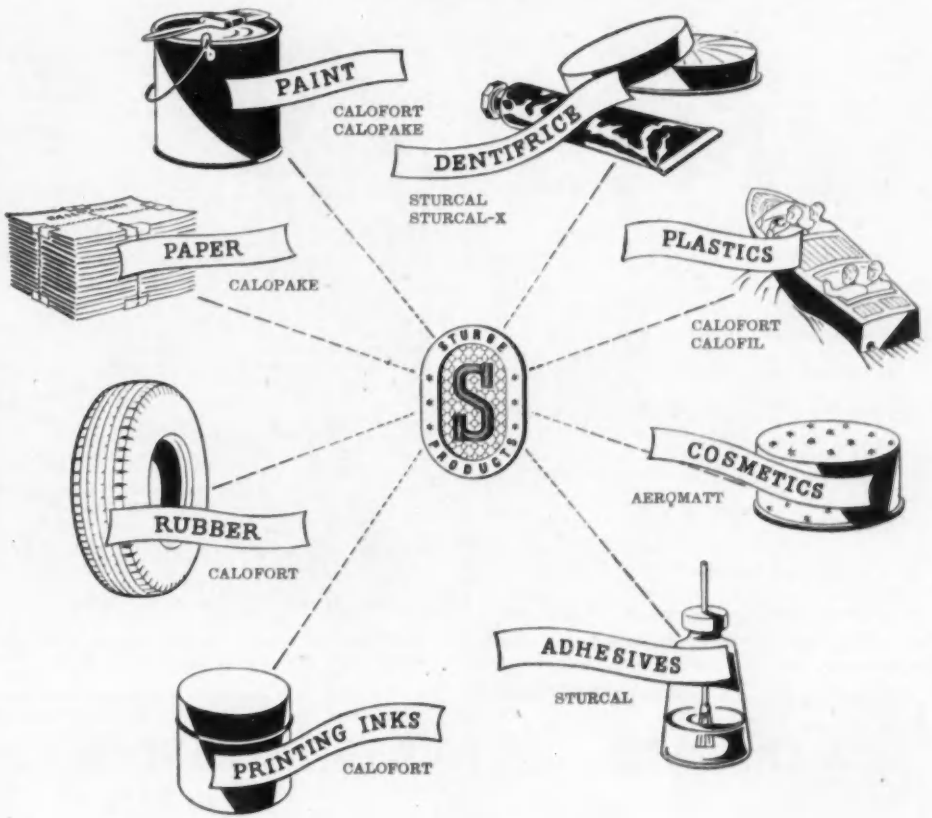

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